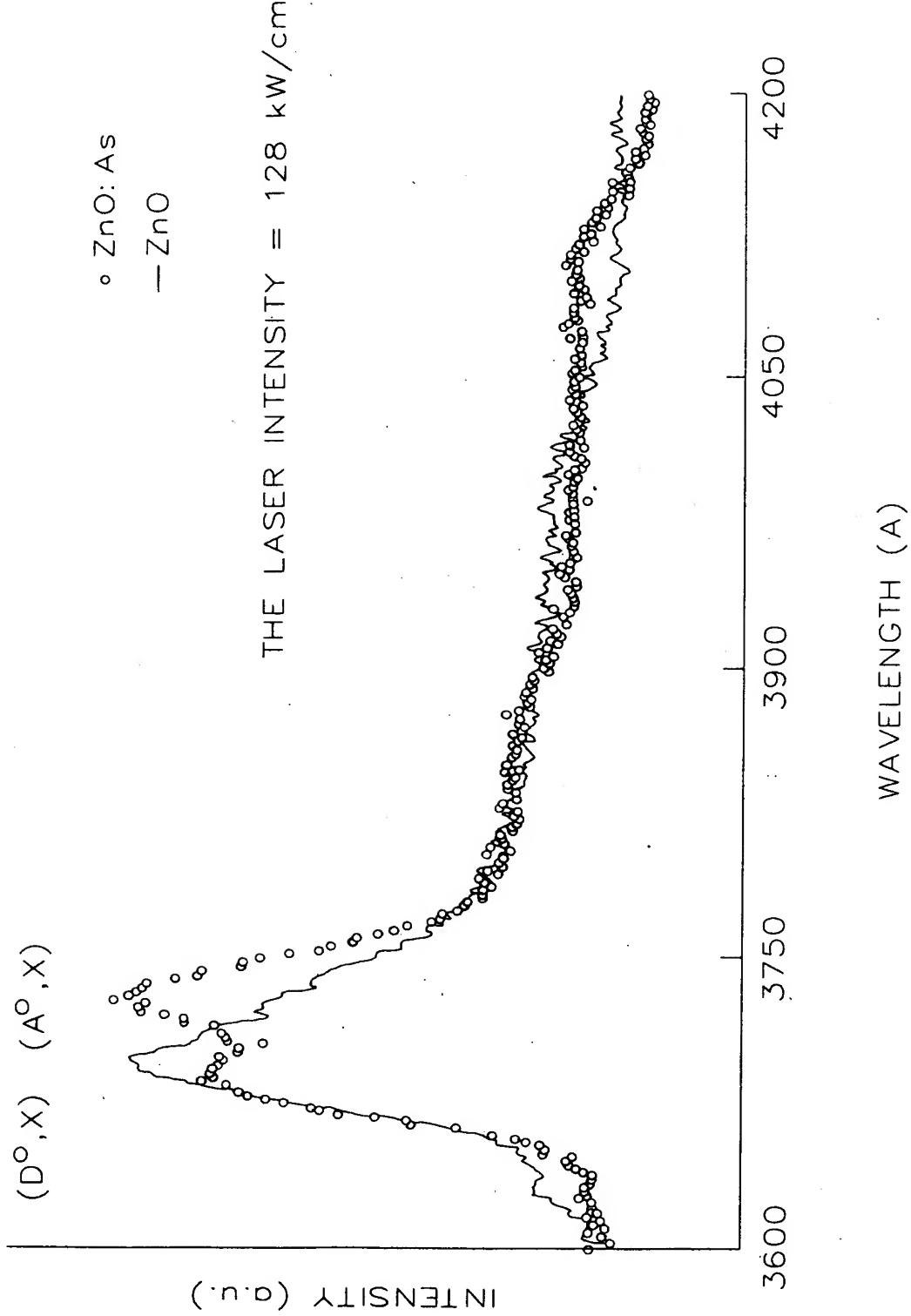


FIG. 1

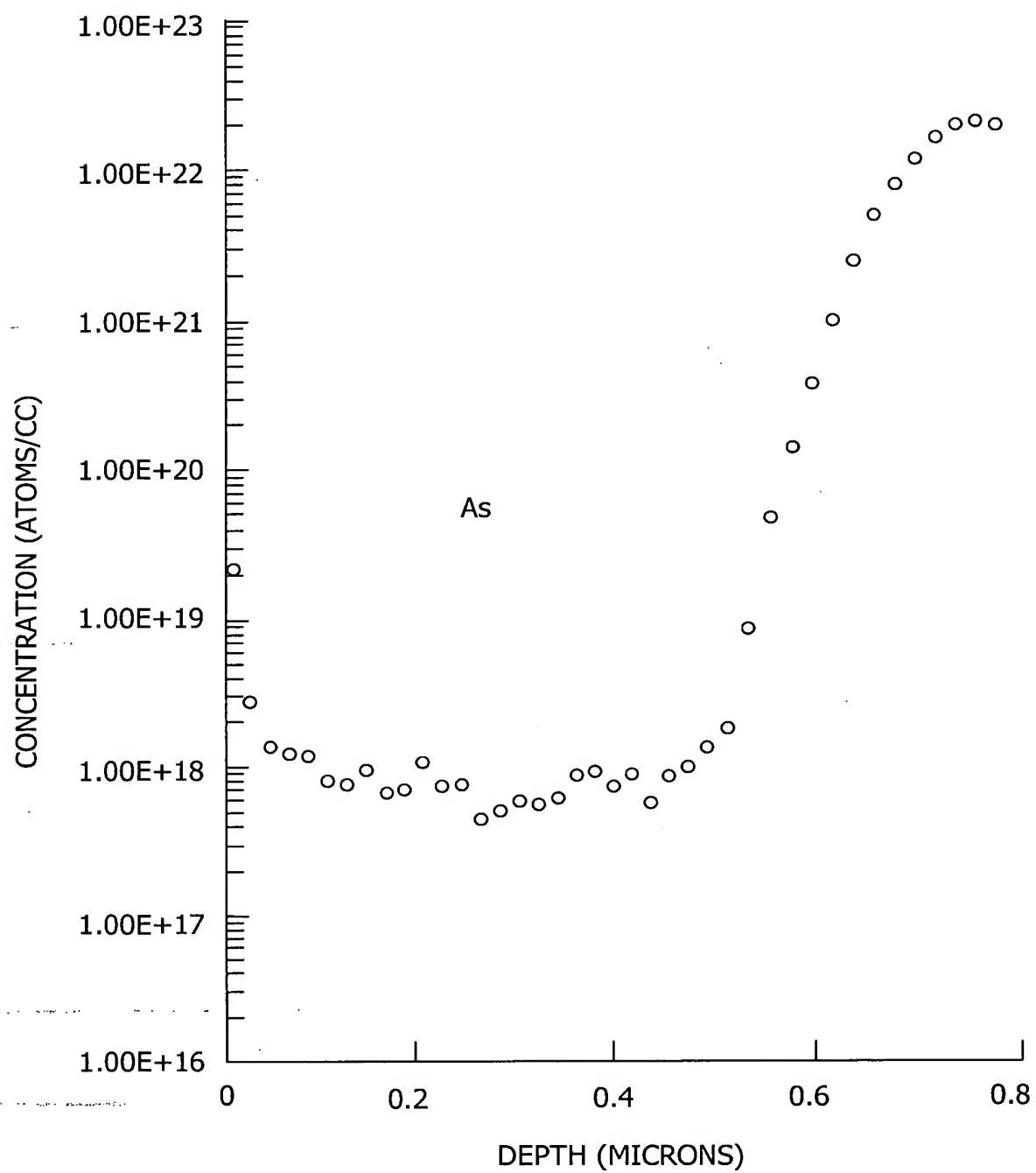
FIG. 2

PL: ZnO VS p-ZnO: As AT 20 K



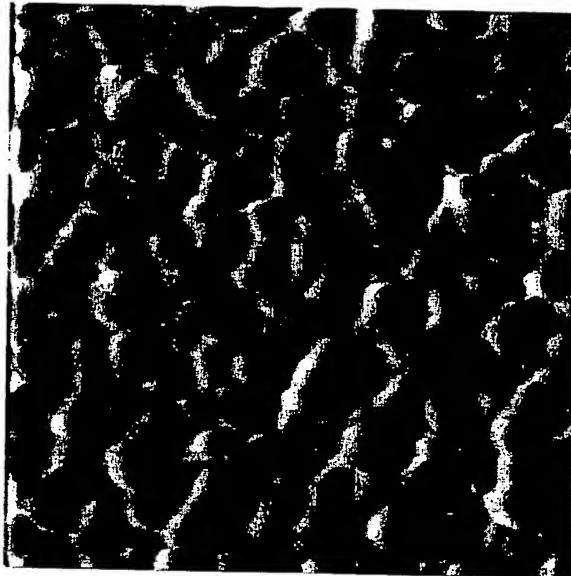
**FIG. 3**

SIMS: p-ZnO

PRIMARY ION BEAM:  $\text{Cs}^+$ 

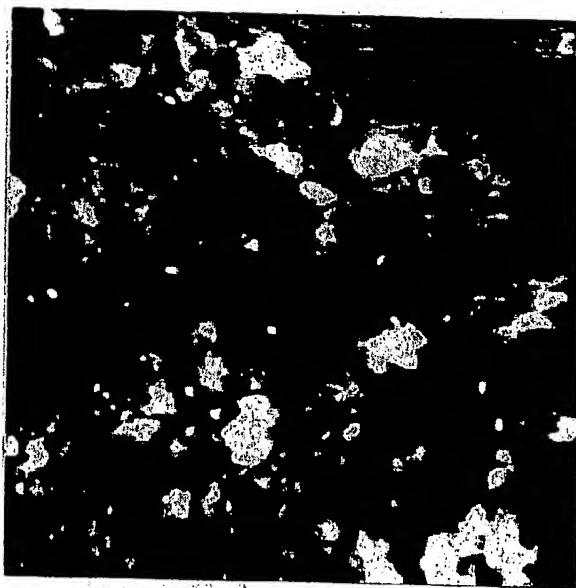
**FIG. 4**

0.5  $\mu\text{m}$



**FIG. 5**

0.5  $\mu\text{m}$



# FIG. 6

5/9

Table 1. Electrical properties of Al-doped ZnO on  $\text{Al}_2\text{O}_3$  measured by the Van der Pauw method. The column headings are, respectively from left to right, magnetic field in units of Gauss, Hall coefficient in units of  $\text{cm}^3/\text{Coulomb}$ , resistivity in units of  $\text{Ohm}\cdot\text{cm}$ , density of carriers in units of  $\text{cm}^{-3}$ , carrier mobility in units of  $\text{cm}^2/\text{volt}\cdot\text{sec}$ , and sample temperature in units of Kelvin.

Field (Gauss)	Hall Coefficient ( $\text{cm}^3/\text{Coulomb}$ )	Resistivity ( $\text{Ohm}\cdot\text{cm}$ )	Carrier Density ( $\text{cm}^{-3}$ )	Mobility ( $\text{cm}^2/\text{volt}\cdot\text{sec}$ )	Temperature (Kelvin)
5004	-1.13	1.03	$-5.52 \times 10^{18}$	-1.09	290
4002	-1.07	1.03	$-5.81 \times 10^{18}$	-1.04	290
3001	-1.13	1.03	$-5.53 \times 10^{18}$	-1.09	290
1998	-1.32	1.03	$-4.74 \times 10^{18}$	-1.27	290
1001	-1.50	1.03	$-4.16 \times 10^{18}$	-1.45	290

**FIG. 7**

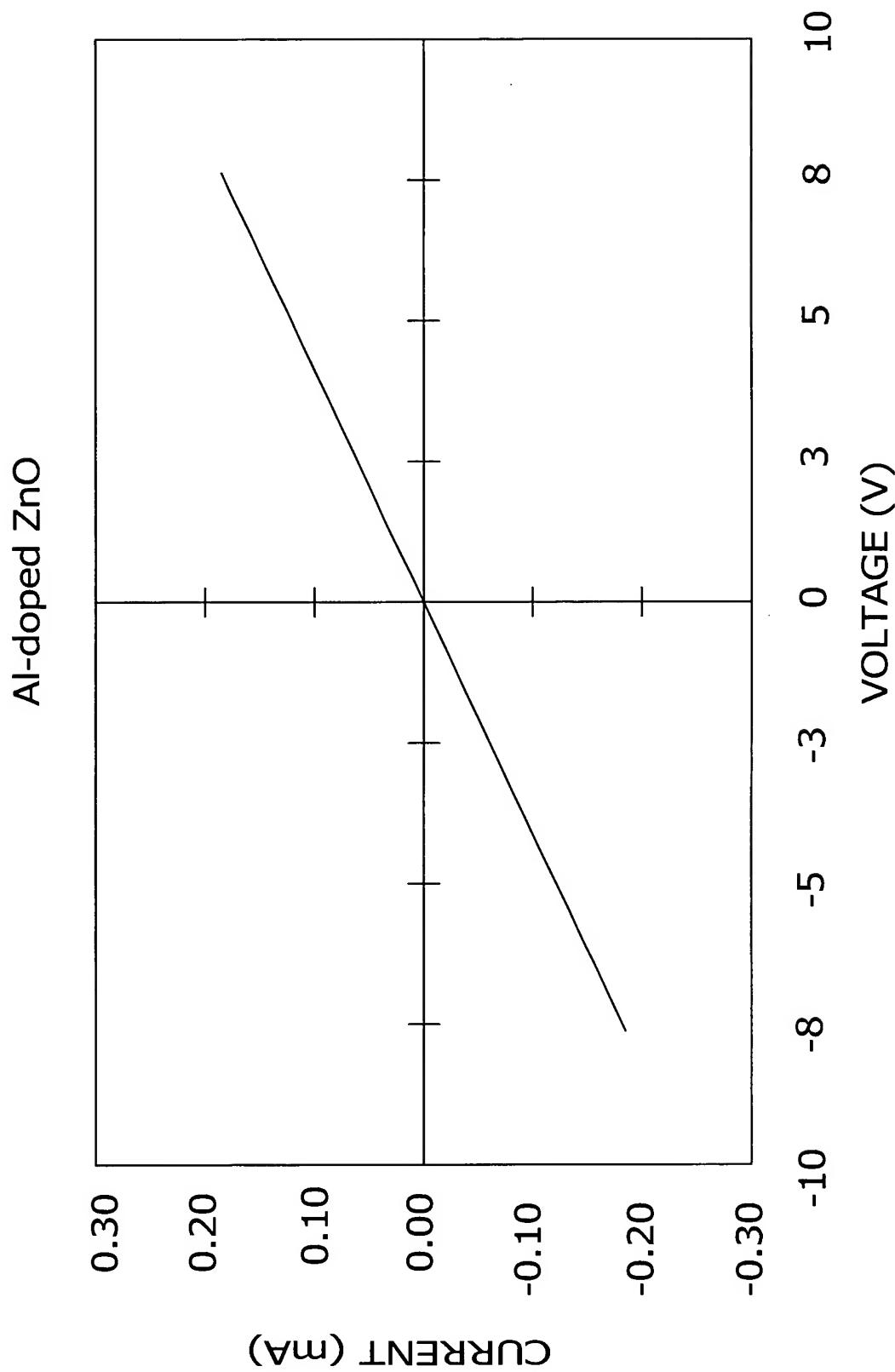


FIG. 8  
I-V MEASUREMENT

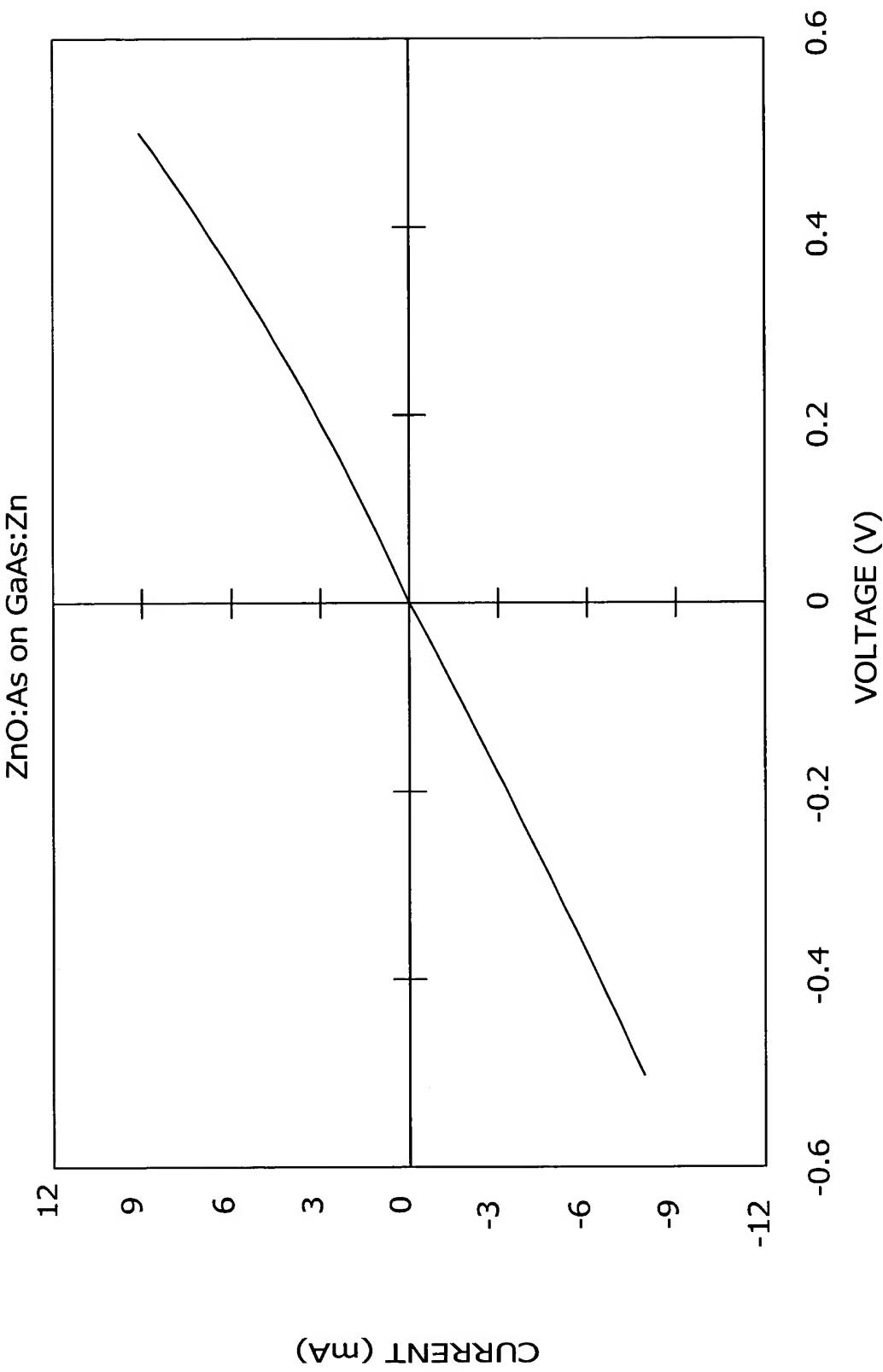
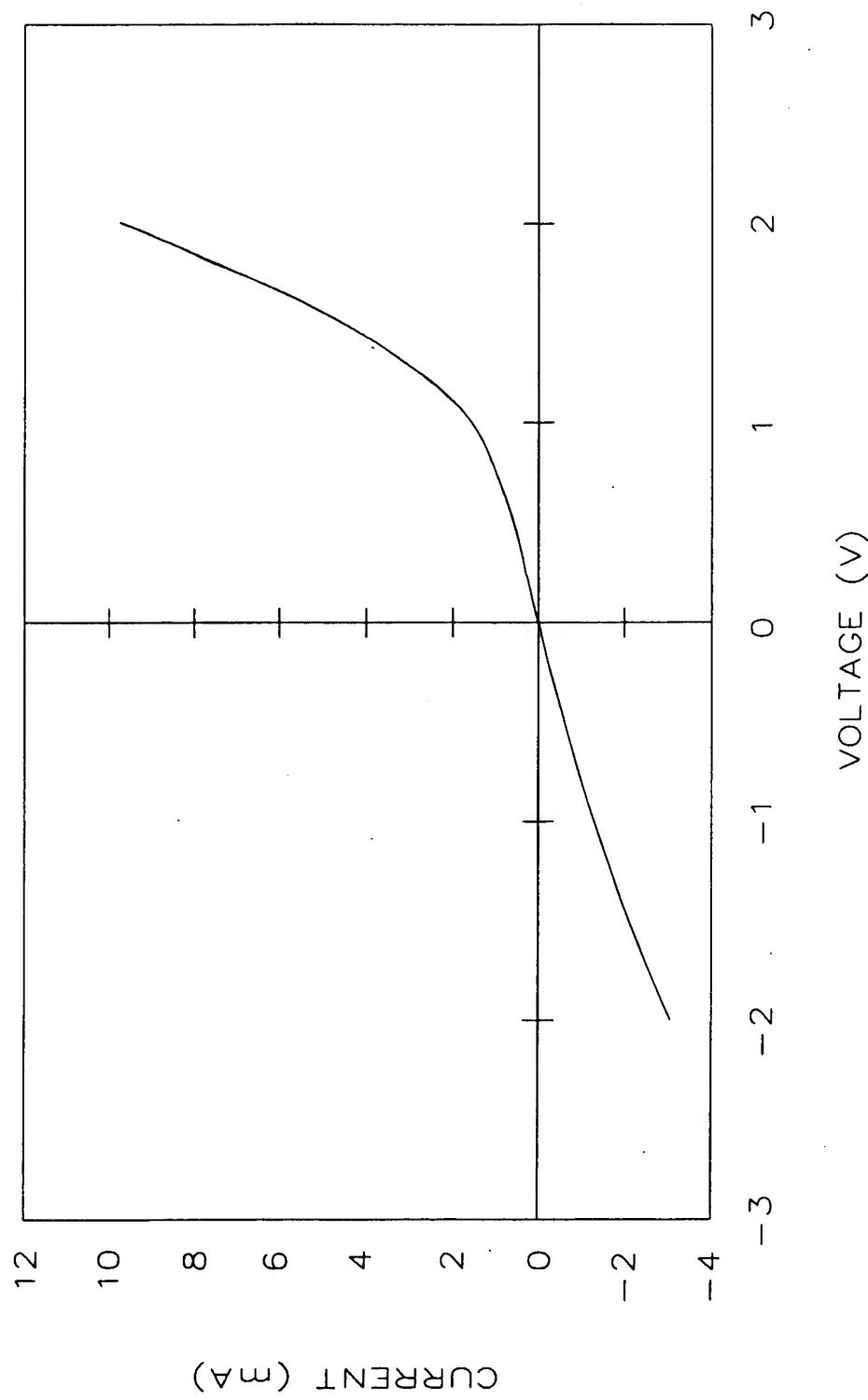


FIG. 9

I-V MEASUREMENT

PN-JUNCTION OF ZnO



**FIG. 10**

A CROSS SECTION OF A ZnO P-N JUNCTION

